United States Department of Agriculture | Forest Service | Southwestern Region Forest Health Arizona Zone Office | 2500 S. Pine Knoll Drive Flagstaff, AZ 86001-6381 FAX (928) 556-2130 Voice (928) 556-2073

File Code: 3420 **Date:** May 9, 2007
Route To:

Subject: Pine engraver beetle activity associated with ADOT project

To: District Ranger, North Kaibab RD, Kaibab NF

I visited the North Kaibab Ranger District at the request of Steve Boyer, District Silviculturist, on April 20, 2007. Steve had observed large volumes of logging slash associated with an Arizona Department of Transportation (ADOT) project along Highway 89A, and was concerned about potential pine engraver beetle activity associated with this project. I describe in this report what bark beetle activity was observed and outline potential strategies to minimize future bark beetle impacts associated with such projects.

It appeared that ADOT was conducting this right-of-way project to remove de-icing salt damaged trees, increase the amount of sunlight reaching the highway to reduce the need for de-icing salt, and possibly removing hazard trees associated with the Warm Fire. Tree cutting had occurred intermittently along approximately 15 miles of highway, and included ponderosa pine trees of all size classes. Tree felling was actively occurring near Jacob Lake (junction of Highway 89A and Highway 67), while logging had occurred previously at lower elevations to the east and north. Log decks and un-piled slash was present at the higher elevation sites, while most log decks had already been removed and slash piled at the lower elevation areas (***Figure 1***).

Steve and I stopped at several points along Highway 89A to examine slash for pine engraver beetle (*Ips pini*) activity. No beetle activity was observed at the higher elevation sites near Jacob Lake. Limited beetle activity was found in slash at areas lower in elevation to the north going toward Fredonia. Egg galleries were being constructed in approximately less than 10 percent of the slash. Most galleries were in slash sized 4 – 10 inches in diameter, although a few larger pieces of slash contained limited number of galleries. Smaller diameter slash (<2 inches) was being colonized by twig beetles. In addition, one log present had freshly constructed roundheaded pine beetle egg galleries.

The greater amount of pine engraver beetle activity at the lower elevation areas was likely the result of two factors. First, slash had been generated earlier in the season (beginning in mid-March based on observations by Steve) in the lower elevation areas which allowed beetles a greater amount of time to find the host material. Second, in general, pine engraver beetles attacking ponderosa pine are more prevalent and cause more damage at lower elevation sites due to climate effects on hosts and perhaps more optimal developmental temperatures. Further monitoring later in the season will determine if there is a greater risk of beetle build up in lower elevation areas.

Based on an informal survey of ponderosa pine mortality along Highway 89A, all recent tree mortality was in larger tree classes and likely caused by a combination of western pine beetle (*Dendroctonus brevicomis*) and roundheaded pine beetle (*D. adjunctus*). Western pine beetle and roundheaded pine beetle prefer larger diameter ponderosa pine and the whole crown fades at

the same time or in a bottom up fashion. In contrast, pine engraver beetles primarily attack smaller diameter pine or the tops of large diameter trees, which causes needles to fade in the top of the crown first. Neither top down fading nor small diameter tree mortality was observed along Highway 89A.

Historical records of bark beetle activity on the North Kaibab suggest that the primarily ponderosa pine killing species are in the *Dendroctonus* genus (western pine beetle, roundheaded pine beetle, mountain pine beetle). Although *Ips confusus* caused considerable mortality to piñon pine on the North Kaibab during 2002-2003, we have not observed much *Ips* activity on ponderosa pine during this time or previously. This indicates that risk associated with *Ips* species on ponderosa pine in this area is limited.

What can be expected if local populations of pine engraver beetle increase in the slash? Observations in other geographic locations have found up to 10% mortality of residual trees within the immediate vicinity of forest management activities that generate large amounts of suitable slash. As indicated above, mortality would primarily be in smaller diameter classes or the tops of larger diameter trees. Pine engraver beetle outbreaks are generally very short lived lasting on 1-2 years (Parker 1991).

Figure 1. *Fresh ponderosa pine slash along Highway 89A near Jacob Lake (top left), slash piles on Highway 89A headed towards Fredonia (top right) and pine engraver beetle galleries in slash (bottom right).*

Recommendations and guidelines for managing pine engraver beetles

At this point in time, it does not seem there is a large risk associated with the ADOT project along Highway 89A. This conclusion is based on low levels of slash currently being infested, no observable *Ips*-caused pine mortality, and little historical evidence of *Ips* problems on the North

Kaibab. However, I recommend the District continue to monitor the situation along Highway 89A. Our office can assist in this monitoring. I have already discussed this matter with our Biological Technician, Steve Dudley, who conducts annual Aerial Detection Surveys on the North Kaibab. Steve will pay close attention to any mortality that seems to be associated with the ADOT project.

Guidelines for managing slash to minimize pine engraver beetle impacts are outlined by Parker (1991). Preventative treatments include 1) utilization or destruction of slash and logs greater than 4 inches in diameter, 2) generating slash only during July through December, and 3) avoiding creating slash more than one year in adjacent areas. Suppression treatments include treating infested slash by mechanical means (chipping, burning, burying), solarization treatments using heavy clear plastic, and removal of infested material. If slash is treated within 30 days of being generated during the active pine engraver beetle season (March – September), populations of beetles can actually be reduced.

If you have any questions regarding my assessment or my recommendations, please do not hesitate to contact me.

/s/ Joel D. McMillin
JOEL D. McMILLIN
Entomologist, Forest Health, Arizona Zone

cc: Stephen F Boyer
Stu Lovejoy
Gilbert Zepeda
John Anhold
Debra Allen-Reid
Steve Dudley
Mailroom R3 Kaibab

References

Parker, D.L. 1991. Integrated pest management guide: Arizona five-spined Ips, *Ips lecontei* Swaine, and Pine engraver, *Ips pini* (Say), in ponderosa pine. USDA Forest Service, Southwestern Region, R-3, 91-8. 17 p.